

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-19. (canceled)

20. (Currently amended) A method for optical control of the quality of a process of chemical mechanical planarization (CMP) by determining the existence of a-residues of a metal-containing layer effect-on the surface of an article resulting from the CMP process applied to said article, the CMP processed article having a surface with at least one pattern in the form of spaced-apart metal-containing regions, the method comprising the steps of:

- selecting at least one predetermined site on the article to apply local spectral measurements to said at least one predetermined site ~~be to thereby controlled~~ the quality of the CMP process applied to said at least one predetermined site, said selecting comprising at least one of the following procedures: (i) ~~by~~-analysing a structure which is similar to that of said article to be controlled but under-polished by the CMP process, and detecting the ~~effect~~-presence of residues on said under-polished structure, said at least one predetermined site being that where the ~~effect~~-presence of residues is detected; (ii) utilizing product related information defining potential sites for the presence of the residues in the article to be controlled; (iii) utilizing process related information defining potential sites for the presence of the residues in the article to be controlled; (iv) acquiring an image

- of at least a part of the article and carrying out an image processing of the acquired image;
- applying the spectral measurements to said at least one selected predetermined site on the article by illuminating said at least one predetermined site on said article to be controlled, detecting light returned from the illuminated site, and generating data indicative of the detected light; and
 - analysing said data indicative of the detected light for determining the existence of the effects of residues.

21. (Cancelled)

22. (Currently amended) The method according to Claim ~~21~~²⁰, wherein said selecting step includes procedure (iv) and said image processing comprises at least one of the following steps:

- detecting at least one site of the structure characterised by substantially irregular geometry;
- detecting at least one site of the structure characterised by predetermined optical properties indicative of a predetermined range of contrast of said image;
- detecting at least one site of the structure characterised by optical properties different from optical properties of other sites of the structure.

23. (Currently amended) The method according to Claim 20, wherein said selecting step includes procedure (i), in which said analysing a structure which is similar to that of said article to be controlled but under-polished by the CMP process
~~selecting of the at least one predetermined site comprises the steps of:~~

- applying spectral measurements to said similar structure and providing data indicative of spectral characteristics of said structure; and
- analysing said data indicative of the spectral characteristics of said structure.

24. (Currently amended) The method according to Claim ~~23~~20, wherein said data indicative of the detected light includes spectral characteristics of said structure, said analysing of the data indicative of the spectral characteristics of said structure comprises determining optical properties of a material on top of the structure.

25. (Currently amended) The method according to Claim ~~23~~20, wherein said data indicative of the detected light includes spectral characteristics of said structure, said analysing of the data indicative of the spectral characteristics of said structure comprises determining a thickness of the uppermost layer of the structure.

26. (Previously presented) The method according to Claim 20, wherein the CMP process is applied to the article containing stacks each formed by a different layer structure, the method also comprising the step of providing information regarding a location of at least one of erosion and dishing effects on a layer underneath the top layer of the structure, said at least one predetermined site being selected at said location.

27. (Previously presented) The method according to Claim 20, wherein the analysed structure is an article similar to the article to be controlled.

28. (Previously presented) The method according to Claim 20, wherein the analysed structure is a simulated model of said article to be controlled.

29. (Cancelled)

30. (Currently amended) The method according to Claim ~~30~~²⁴, wherein said selecting step includes procedure (iv) and said image processing ~~analysing of the generated data~~ comprises at least one of the following steps:

- detecting the existence of substantially irregular geometry within said at least one predetermined site;
- detecting predetermined optical properties of said at least one predetermined site indicative of a predetermined range of said image; and
- detecting difference in optical properties of said at least one predetermined site and other sites of the structure.

31. (Cancelled)

32. (Currently amended) The method according to Claim ~~31~~²⁵, wherein said selecting step includes procedure (iv) and said image processing ~~analysing of the generated data~~ comprises at least one of the following steps:

- detecting the existence of substantially irregular geometry within said at least one predetermined site;
- detecting predetermined optical properties of said at least one predetermined site indicative of a predetermined range of said image; and
- detecting difference in optical properties of said at least one predetermined site and other sites of the structure.

33. (Cancelled)

34. (Currently amended) The method according to Claim ~~33~~26, wherein said selecting step includes procedure (iv) and said image processing analysing of the generated data comprises at least one of the following steps:

- detecting the existence of substantially irregular geometry within said at least one predetermined site;
- detecting predetermined optical properties of said at least one predetermined site indicative of a predetermined range of said image; and
- detecting difference in optical properties of said at least one predetermined site and other sites of the structure.

35. (Cancelled)

36. (Currently amended) The method according to Claim ~~35~~23, wherein said data indicative of the detected light includes spectral characteristics of said structure, said analysing of the generated data comprises determining optical properties of a material on top of the structure.

37. (Currently amended) The method according to Claim ~~35~~23, wherein said data indicative of the detected light includes spectral characteristics of said structure, said analysing of the generated data comprises determining a thickness of the uppermost layer of said article to be controlled.

38. (Cancelled)

39. (Currently amended) The method according to Claim ~~38~~26, wherein said data indicative of the detected light includes spectral characteristics of said structure, said analysing of

the generated data comprises determining optical properties of a material on top of the structure.

40. (Currently amended) The method according to Claim ~~38~~26, wherein said data indicative of the detected light includes spectral characteristics of said structure, said analysing of the generated data comprises determining a thickness of the uppermost layer of said article to be controlled.

41. (Cancelled)

42. (Currently amended) The method according to Claim ~~41~~27, wherein said data indicative of the detected light includes spectral characteristics of said structure, said analysing of the generated data comprises determining optical properties of a material on top of the structure.

43. (Currently amended) The method according to Claim ~~41~~27, wherein said data indicative of the detected light includes spectral characteristics of said structure, said analysing of the generated data comprises determining a thickness of the uppermost layer of said article to be controlled.

44. (Previously presented) The method according to Claim 37, and also comprising the step of utilising the determined thickness to adjust a working parameter of a processing tool to carry out the CMP processing of a further similar article.

45. (Previously presented) The method according to Claim 40, and also comprising the step of utilising the determined thickness to adjust a working parameter of a processing tool to carry out the CMP processing of a further similar article.

46. (Previously presented) The method according to Claim 43, and also comprising the step of utilising the determined

thickness to adjust a working parameter of a processing tool to carry out the CMP processing of a further similar article.

47. (Currently amended) A tool used in manufacturing semiconductor wafers, the tool comprising a polisher to be applied to the wafer for performing a chemical mechanical planarization (CMP) of an uppermost layer of the wafer to define at least one surface pattern in the form of spaced-apart metal regions spaced by non-metal regions, and an optical monitoring system operable to apply optical inspection to at least one predetermined site on the wafer for determining the existence of residues of a metal-containing layer on the wafer caused by resulting from the CMP process applied to said wafer aimed at removing said layer, the optical monitoring system comprising: an optical system operable to carry out spectral measurements and generate measured data indicative thereof; and a processor unit operable to select said at least one site for measurements and analyze the measured data, said processor unit selecting said at least one site by carrying out at least one of the following: (i) analysing data representative of a wafer which is similar to that of said wafer under processing but under-polished by the CMP process, and detecting the presence of residues on said under-polished wafer, said at least one predetermined site being that where the presence of residues is detected; (ii) utilizing product related reference data defining at least one potential site for the presence of the residues in the wafer under processing; (iii) utilizing product related reference data defining at least one potential site for the presence of the residues in the wafer under processing; (iv) analyzing data indicative of an image of at least a part of the wafer under processing.

48. (Previously presented) The tool according to Claim 47, wherein said optical monitoring system comprises:

- a spectrophotometer for applying to the processed wafer to illuminate at least one predetermined site on the wafer by incident radiation of a pre-set substantially wide wavelength range and detect light reflected from the illuminated site for providing measured data representative of photometric intensities of detected light within said wavelength range;
- an imaging arrangement operable to acquire images formed by light reflected from the wafer.
- a processor unit connectable to the spectrophotometer, the processor unit being preprogrammed with a pattern recognition software for analyzing the acquired image to locate said at least one predetermined site, and being operable to analyse said measured data and generate corresponding data to be used for adjusting a working parameter of the polisher prior to be applied to a further wafer.

49. (Previously presented) The tool according to Claim 47, wherein said optical monitoring system comprises an imaging arrangement operable to acquire images formed by light reflected from the wafer and generating measured data indicative thereof; and a processor unit connectable to the imaging arrangement and being preprogrammed with a pattern recognition software for analyzing said measured data and generating corresponding data to be used for adjusting a working parameter of the polisher prior to be applied to a further wafer.

50. (New) The method according to Claim 20, wherein the information used for selecting the at least one predetermined site on the article includes data indicative of the surface

topography resulting from processing the article prior to said CMP process to be controlled.

51. (New) The method according to Claim 20, wherein said metal is copper.

52. (New) The method according to Claim 25, wherein said metal is copper.

53. (New) The method according to Claim 26, wherein said metal is copper.

54. (New) The method according to Claim 20, wherein said selecting step includes procedure (iv) and said image processing comprises comparison of data indicative of the acquired image of the at least one selected site to that of previously stored reference image, and detecting data indicative of real residues on the article.

55. (New) The method according to Claim 54, comprising identifying whether the acquired image contains features that are not found in the reference image.